AMENDMENTS TO THE SPECIFICATION

Please replace the present title with the following rewritten title:

METHOD AND APPARATUS FOR IMAGE TEXTURE ~~RETRIEVING METHOD AND APPARATUS THEREOF~~ DESCRIBING

Please amend the paragraph bridging pages 2 and 3 as follows:

According to another aspect of the present invention, there is ~~provide~~ provided a method for retrieving an image texture descriptor for describing texture features of an image, ~~includes~~ including the steps of (a) filtering input images using predetermined filters having different scale coefficients, (b) projecting the filtered images onto axes of each predetermined direction to obtain data groups consisting of averages of each directional pixel values, (c) determining a plurality of indicators based on scale coefficients of the filters used in filtering data groups selected among the data groups by a predetermined selection method, (d) determining the plurality of indicators as the texture descriptor of the image.

Page 3, please amend the first full paragraph as follows:

According to still another aspect of the present invention, there is provided a method for retrieving an image texture descriptor for describing texture features of an image, comprising the steps of (a) filtering input images using predetermined filters having different orientation coefficients and different scale coefficients, (b) projecting the filtered images onto horizontal and vertical axes to obtain horizontal-axis projection graphs and vertical-axis projection graphs, (c) calculating normalized auto-correlation values for each graph, (d) obtaining a local ~~maximums~~maximum and a local minimum for each normalized auto-correlation value, at which the calculated normalized auto-correlation values ~~forms~~form a local peak and a local valley at a

predetermined section, (e) defining the average of the local maximums and the average the local minimums as contrast, (f) selecting graphs in which the ratio of the standard deviation to the average of the local maximums is less than or equal to a predetermined threshold as first candidate graphs, (g) determining the type of the second candidate graphs according to the number of graphs filtered by the filters having scale coefficients or orientation coefficients which are close to or identical with the scale coefficients or orientation coefficients of the filters used in filtering the selected second candidate graphs, (h) counting the numbers of graphs belonging to the respective types of second candidate graphs and determining predetermined weights of each type of second candidate graphs, (i) calculating the sum of products of the counted numbers of graphs and the determined weights to determine the calculation result value as a first indicator constituting a texture descriptor, (j) determining the orientation coefficients and scale coefficients of the second candidate graphs having the biggest contrast as second through fifth indicators, and (k) determining indicators including the first indicator and the second through fifth indicators as the texture descriptors of the corresponding image.

Please amend the paragraph bridging pages 4 and 5 as follows:

The step (g) includes the sub-steps of (g-1), if there are one or more graphs having scale or orientation coefficients identical with those of a pertinent candidate graph and one or more graphs having scale or orientation coefficients close to those of the pertinent candidate graph, classifying the pertinent candidate graph as a first type graph, (g-2) if there are one or more graphs having scale or orientation coefficients identical with those of a pertinent candidate graph but there is no graph having scale or orientation coefficients close to those of the pertinent candidate graph, classifying the pertinent candidate graph as a second type graph, and (g-3) if

there is no graph having scale or orientation coefficients identical with or close to those of a pertinent candidate graph, classifying the pertinent candidate graph as a third type graph.

Please amend the paragraph bridging pages 5 and 6 as follows:

To achieve the second object of the present invention, there is provided a computer readable medium having program codes executable by a computer to perform a method for an image texture descriptor for describing texture features of an image, the method including the steps of (a) filtering input images using predetermined filters having different orientation coefficients and different scale coefficients, (b) projecting the filtered images onto horizontal and vertical axes to obtain horizontal-axis projection graphs and vertical-axis projection graphs, (c) calculating normalized auto-correlation values for each graph, (d) obtaining a local ~~maximums~~maximum and a local ~~minimums~~minimum for each of normalized auto-correlation values, at which the calculated normalized auto-correlation ~~value~~values ~~forms~~form a local peak and a local valley at a predetermined section, (e) defining the average of the local maximums and the average the local minimums as contrast, (f) selecting graphs in which the ratio of the standard deviation to the average of the local maximums is less than or equal to a predetermined threshold as first candidate graphs, (g) determining the type of the second candidate graphs according to the number of graphs filtered by the filters having scale coefficients or orientation coefficients which are close to or identical with the scale coefficients or orientation coefficients of the filters used in filtering the selected second candidate graphs, (h) counting the numbers of graphs belonging to the respective types of second candidate graphs and determining predetermined weights of each type of second candidate graph, (i) calculating the sum of products of the counted numbers of graphs and the determined weights to determine the calculation result value

as a first indicator constituting a texture descriptor, (j) determining the orientation coefficients and scale coefficients of the second candidate graphs having the biggest contrast as second through fifth indicators, and (k) determining indicators including the first indicator and the second through fifth indicators as the texture descriptors of the corresponding image.

Page 6, please amend the first full paragraph as follows:

To achieve the third object of the present invention, there is provided an apparatus ~~method~~ for retrieving an image texture descriptor for describing texture features of an image, the apparatus including filtering ~~mean~~means for filtering input images using predetermined filters having different orientation coefficients, projecting means for projecting the filtered images onto axes of each predetermined direction to obtain data groups consisting of averages of each of the directional pixel values, classifying means for selecting candidate data groups among the data groups by a predetermined classification method, first indicator determining means for determining another indicator based on the number of graphs filtered by filters having scale coefficients or orientation coefficients which are close to or identical with the scale coefficients or orientation coefficients of the filters used in filtering the selected candidate graph, and second indicator determining means for determining a plurality of indicators based on scale coefficients and orientation coefficients of the filters used in filtering the determined candidate graphs.

Please amend the paragraph bridging pages 6, 7 and 8 as follows:

Alternatively, there is provided an apparatus for retrieving an image texture descriptor for describing texture features of an image, the apparatus including a filtering unit for filtering input images using predetermined filters having different orientation coefficients and different scale coefficients, an image mean/variance calculating unit for calculating the mean and variance of

pixels with respect to each of the filtered images, and obtaining a predetermined vector using the calculated mean and variance, a projecting unit for projecting the filtered images onto horizontal and vertical axes to obtain horizontal-axis projection graphs and vertical-axis projection graphs, a calculating unit for calculating a normalized auto-correlation value for each graph, a peak detecting/analyzing unit for detecting local maximums and local minimums for each auto-correlation value, at which the calculated normalized auto-correlation values forms a local peak and a local valley at a predetermined section, a mean/variance calculating unit for calculating the average of the local maximums and the average of the local minimums, a first candidate graph selecting/storing unit for selecting the graphs satisfying the requirement that the ratio of the standard deviation to the average of the local maximums be less than or equal to a predetermined threshold, as first candidate graphs, a second candidate graph selecting/storing unit for applying a predetermined clustering algorithm to the first candidate graphs to select the same as second candidate graphs, a classifying unit for counting the number of graphs belonging to each of the respective types of the second candidate graphs, outputting data signals indicative of the number of graphs of each type, determining predetermined weights of the graphs belonging to the respective types and outputting data signals indicative of weights to be applied to each type, a first indicator determining unit for calculating the sum of the products of the data representing the number of graphs belonging to each type, and the data representing the weights to be applied to each type, determining and outputting the calculation result as a first indicator constituting a texture descriptor, a contrast calculating unit for calculating the contrast according to formula (2) using the averages output from the mean/variance calculating unit and outputting a signal indicating that the calculated contrast is biggest, a second candidate graph selecting/storing unit

for outputting the candidate graphs having the biggest contrast among the second candidate graphs stored therein in response to the signal indicating that the calculated contrast is biggest, a second-to-fifth indicator determining unit for determining the orientation coefficient of a graph having the biggest contrast, among the horizontal-axis projection graphs; the orientation coefficient of a graph having the biggest contrast, among the vertical-axis projection graphs, as a second indicator; the scale coefficient of a graph having the biggest contrast, among the horizontal-axis projection graphs, as a fourth indicator; and the scale coefficient of a graph having the biggest contrast, among the vertical-axis projection graphs, as a fifth indicator, and a texture descriptor output unit for combining the first indicator, the second through fifth indicators and the predetermined vector and outputting the combination result as the texture descriptors of the corresponding image.

Please amend the paragraph bridging pages 8 and 9 as follows:

Referring to FIG. 1A showing an image texture descriptor retrieving method according to the present invention, assuming that N is a predetermined positive integer, an input image consisting of NxN pixels, for example, 128x128 pixels, is filtered using a Gabor filter (step 100). The Gabor filter is ~~constituted by~~ made up of filters having different orientation coefficients and different scale coefficients. Assuming that C1 and C2 are predetermined positive integers, the input image is filtered by filters having C1 kinds of orientation coefficients and C2 kinds of scale coefficients, and the filters output C1xC2 kinds of filtered images.

Page 10, please amend the second full paragraph as follows:

Now, the second candidate graphs are classified into three types (step 116). The classification is performed according to the number of graphs filtered by a filter having scale or orientation coefficients which are close to or identical with those of a filter used for filtering the second candidate graphs. Hereinafter, for the ~~convenience'~~ sake of ~~explanation~~ convenience, the graphs filtered by a filter having a certain scale coefficient or a constant orientation coefficient will be referred to as certain-scale-coefficient graphs or certain-orientation-coefficient graphs.

Page 12, please amend the third full paragraph as follows:

In other words, in the image texture descriptor retrieving method according to the present invention, the texture descriptor allows the kinds of texture structures present in an image to be perceptually captured.

Page 12, please amend the fourth full paragraph as follows:

It has been described that a first indicator $V1_1$ which is a quite a good indicator of the structuredness of the texture of an image, the second and third indicators V2 and $V3_1$ representing two quantized orientations in which the structuredness is captured most, and the fourth and fifth indicators V4 and V5 representing two quantized scales in which the structuredness is captured most, are used as the texture descriptors of the image. However, the above-described embodiment is used in a descriptive sense only and not for the purpose of limitation. A single indicator that is most suitable to the characteristics of an image and arbitrarily selected plural indicators, can also be used as the texture descriptor(s) of the image. Therefore, the above-described embodiment is not intended as a restriction on the scope of the invention.

Page 13, please amend the first full paragraph as follows:

Also, the image texture descriptor retrieving method is programmable ~~by~~as a computer program. Codes and code segments constituting the computer program can be easily derived by a computer programmer in the art. Also, the program is stored in computer readable media and is readable and executable by the computer, thereby embodying the image texture descriptor retrieving method. The media include magnetic recording media, optical recording media, carrier wave media, and the like.

Page 14, please amend the fifth full paragraph as follows:

The classifying unit 216, as described with reference to FIG. 1B, counts the numbers of graphs belonging to each of the C1, C2 and C3 types to denote the same by N_1, N_2 and N_3, respectively, with respect to the second candidate graphs, and outputs data signals N_i indicative of the number of graphs of each type. Also, the classifying unit 216 determines ~~predetermined~~the weights of the graphs belonging to each of the C1, C2 and C3 types to then denote the same by W_1, W_2 and W_3, respectively, and outputs data signals W_i indicative of weights to be applied to each type.

Page 15, please amend the last paragraph as follows:

As described above, according to the image texture descriptor retrieving method of the present invention, texture descriptors which allow the kinds of texture structure present in an image to be perceptually captured can be retrieved.